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ABSTRACT

Two methods for promoting peer collaboration among students conducting research were examined. Student interaction was structured using either computer-mediated conferencing or the fishbowl technique. Both techniques produced similar levels of student participation. Questionnaire results indicated that the fishbowl technique was perceived as providing somewhat greater benefits in solving research problems although students viewed both techniques positively. In general, students were similar in their motivation for using either of the discussion techniques, with seeking help on their research project being the highest-rated reason. An advantage to computer mediated conferencing is that is can be implemented in large classes where the fishbowl technique would be impractical. Both techniques are therefore available to improve student participation in class. (Contains 15 references and 3 tables.) (Author)

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Running head: ENCOURAGING PEER COLLABORATION

Encouraging Collaborative Learning: Computer-Mediated Conferencing or Fishbowl Interaction.

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Abstract

Two methods for promoting peer collaboration among students conducting research were examined. Student interaction was structured using either computer-mediated conferencing or the fishbowl technique. Both techniques produced similar levels of student participation. Questionnaire results indicated that the fishbowl technique was perceived as providing somewhat greater benefits in solving research problems although students viewed both techniques positively. In general, students were similar in their motivation for using either of the discussion techniques, with seeking help on their research project being the highest-rated reason. An advantage to computer-mediated conferencing is that it can be implemented in large classes where the fishbowl technique would be impractical. Both techniques are therefore available to improve student participation in class.

Encouraging Collaborative Learning Through Computer-Mediated Conferencing or Fishbowl Interaction

Collaborative learning has increasingly been incorporated into higher education and used to promote discussion and peer learning among students (McKeachie, 1994). Collaboration provides many benefits to the learning environment, such as increasing students' academic motivation and their overall feeling of success (Daniels, 1994). Gamson (1997) indicates that collaboration among students, when it works well, involves self-consciousness about purposes, mutual interdependence, the capacity to benefit from differences, and the ability to resolve conflicts. Peer collaboration has been shown to be an effective teaching technique for students of different levels and personalities across a wide-range of educational goals and content (Johnson & Johnson, 1975; Johnson Maruyama, Johnson, Nelson, & Skon, 1981). However, sometimes collaboration is difficult to teach to students who have been taught that the only way to learn is through the "banking model of education," whereby they passively absorb the ideas of the instructor, make withdrawals of the information during test time, and remain disengaged from the learning process (Freire, 1970).

According to Grudin (1991), the ability to collaborate is a sign of maturation that students develop as they venture away from learning in isolation to being able to work within a larger group. Collaboration among students can be especially difficult when classes are large or there is more than one section of the same class taught by the same teacher. Although more traditional methods can promote collaboration and interaction among students, the use of computers, both in and out of the classroom, has been found to be an effective way of achieving this goal for the students (Anderson, 1996; Althaus, 1997; Collins, 1996/1997). Computer use includes e-mail and computer-mediated conferencing as a way to help students work together on a variety of topics

(Collins, 1996/1997; Jackson, Yorker, & Michem, 1996; Shapiro, Roskos, & Cartwright, 1995), and research results indicate that computers are most effective when instructors are trained in using the technology and when the computer is used in conjunction with classroom instruction (Althaus, 1997; Bialo & Solomon, 1997).

This article describes two methods for encouraging greater student collaborative learning in two undergraduate research methodology classes. Using a computer discussion group similar to that suggested by Anderson (1996) as well as a traditional "fishbowl," we compare and contrast both methods and discuss the strengths and weaknesses of each.

Method

Participants

Fifty-two students participated in this study. There were 38 students (37 women, 1 man) enrolled in an upper-division research methods course in Sociological Inquiry and 14 students (13 women, 1 man) enrolled in an upper-division Psychology laboratory course in Experimental Social Psychology at the University of Nebraska at Kearney. Participants completed the activities for this study as part of their regular course routine. Students in the sociology course participated in computer-mediated conferencing, while students in the psychology course participated in the fishbowl technique.

Implementation.

Computer-mediated conferencing. In this study, we used VAX Notes Conferencing. VAX Notes Conferencing is a text-based conferencing system in which people in different locations can conduct on-line conferences. VAX Notes conferencing can exist on and be accessed from any VMS system that is running the VAX Notes software on a DECnet network and can include electronic bulletin boards. At UNK this system has been replaced by Blackboard, which

provides the same functions in a more user-friendly environment. The bulletin boards are used to create and edit collaborative documents; these documents can be designated either as a public forum for anyone to view or a private forum where access is restricted to specific people.

Computer-mediated conferencing (CMC) was arranged for the Sociological Inquiry class and directed discussions outside the classroom to specific subjects. Students responded to the topic by typing REPLY. A topic and its replies are referred to as a discussion, and several discussions can take place at the same time within the same conference. As part of the project to design an experiment, students were provided with a CMC topic entitled Experimental Design Project with the following directions from their instructor using the VAX Notes Conferencing system: "This is where you can go to talk about your problems or passions on your experiment assignment. Come here for help or support. I am on here frequently so I will help as well but like to see students using each other for help and support."

Fishbowl technique. Structurally, a fishbowl consists of a large group divided into subgroups of approximately equal number (White, 1974). If the classroom permits, the students can be divided into an in-group (those with the primary responsibility for solving a particular problem) and an out-group seated in a circle surrounding the in-group. The out-group members observe and listen to the problem solving efforts of the in-group and when asked, provide advice and guidance to the members of the in-group. The out-group can be of assistance when no solution to the problem occurs to members of the in-group, or when alternative solutions are desired, or as a sort of quality control – critiquing the solutions generated by the in-group. In the present study, the groups included all students registered for the Experimental Social Psychology laboratory classes. In each lab class, there were three subgroups of three or four students engaged in an empirical research project. Each weekly lab period included a discussion of some aspect

(e.g., methodology) of each subgroup's research project. When one of the subgroups was discussing their project, they became the in-group. All students in the lab were seated around the same table, usually next to their group partners. Members of the "out-group" listened to the instructor's discussion with the "in-group" and were invited to offer suggestions to the in-group. All group members had approximately the same amount of time in the in-group (about 20 minutes) and in the out-group (about 40 minutes) each week. The fishbowl continued throughout the semester for 14 weeks.

Materials

The questionnaire designed to evaluate the collaborative process was separate from the regular course evaluation. This questionnaire contained items assessing four general areas: (a) level of participation, (b) motivation, (c) benefits to students from participating, and (d) behaviors outside of the classroom. First, questions asked about students' level of participation as well as comfort with participating in either CMC or the fishbowl. Responses were on a 7-point scale ranging from 1 (*very involved*) to 7 (*little involvement*). Second, items measured the extent to which various motivational factors influenced student participation in the collaborative process. The items were: (a) to earn an acceptable grade, (b) increase my knowledge, (c) get help with my own research, (d) experience a more cooperative atmosphere, (e) build friendships, (f) demonstrate my abilities, (g) help others, (h) sharpen my critical thinking skills, (i) get through the course, and (j) practice open interaction. Each item was accompanied by a 7-point scale ranging from 1 (*great influence*) to 7 (*little influence*). The third part assessed the benefit to students as givers and receivers of information using each type of collaborative process. Questions also asked the extent to which the process had helped students to: (a) solidify the research design, (b) understand difficult material, and (c) solve research problems. Each of the

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benefit statements was accompanied by a 7-point scale ranging from 1 (*great benefit*) to 7 (*little benefit*). Finally, students were asked to respond to questions about how their participation in the collaborative process might have affected their behavior outside of class. Students were asked to indicate the extent to which collaboration affected their participation in classroom discussion unrelated to the research project. This question was accompanied by a 7-point scale ranging from 1 (*much more involved*) to 7 (*no change in involvement*). Students were also asked to indicate how often they discussed their research projects outside of computer-mediated conferencing or the fishbowl. This question was accompanied by a 7-point scale ranging from 1 (*often*) to 7 (*never*).

In addition to the questionnaire data, instructors recorded the number and type of comments and suggestions made through both computer-mediated conferencing and during the fishbowl. The comments were sorted into five categories: (a) formulation of the research question, (b) research design, (c) methodological issues, (d) ethical concerns, and (e) statements of support for the student(s) conducting the research project.

Procedure

The instructors administered the questionnaire immediately before the end of the semester at the same time that they solicited the regular student evaluation of teaching. All students attending class that day completed the questionnaire, which also requested their age, major, sex, year in college, and prior computer experience. In the Sociological Inquiry course in which CMC was used for a variety of purposes, students were asked to reflect on their use of computer-mediated conferencing only as it pertained to their research papers, which required their constructing an experimental design and designing a survey.

Results

Participation Level and Comfort

Students in both courses were asked to describe their level of participation in either the fishbowl or CMC. Students in the fishbowl indicated a higher level of participation ($M = 2.29$) than those using CMC ($M = 4.11$), $F(1, 50) = 20.58$, $p < .001$. The actual numbers of comments recorded from each group are shown in Table 1. There were 85 comments made by students through CMC, and 27 comments were made by the out-group in the fishbowl sessions. The average number of comments per student in CMC was 2.24, while in the fishbowl it was 1.86. Chi square analysis of the number of comments made by students in each of the collaborative situations indicated that this difference was not significant. Students in the two conditions reported approximately the same level of comfort in participating in either CMC ($M = 2.71$) or in the fishbowl ($M = 2.00$), $F(1, 50) < 1$). Students also rated the convenience of participation between CMC ($M = 3.44$) and the fishbowl ($M = 3.61$), $F(1, 50) < 1$ approximately the same.

Table 1 presents the percent of students' comments related to specific aspects of the research process. To determine whether students in each of the collaborative situations made different types of comments, chi square tests for independence were performed. Students in the fishbowl were more likely to comment on methodological issues than were students using computer-mediated conferencing, $\chi_{-}(1) = 3.84$, $p < .05$. No other significant differences between the groups were found. That is, each of the activities related to the research process was discussed approximately equally in both groups.

Motivation for Participation

Ten possible reasons were listed for participating in either the CMC or fishbowl techniques and students were asked the extent to these reasons influenced their involvement.

Table 2 contains the means for each reason along with the results of the analysis of variance comparing those students who participated in computer-mediated conferencing with those who participated in the fishbowl. The results indicate that the most important reason students collaborated in both computer conferencing and the fishbowl was to obtain help with their research, although students in the fishbowl rated that benefit as even more important than did students in computer conferencing. Students in the CMC condition indicated that earning an acceptable grade was their second most important reason for collaboration while students in the fishbowl indicated that helping others was their second most important reason for collaboration.

Benefits from Participation

The questionnaire listed five possible benefits for participation in either the CMC or the fishbowl. Results in Table 3 indicate that students found the fishbowl to be of greater benefit in (a) gaining help with their research design, (b) understanding difficult materials, (c) solving particular research problems, and (d) receiving advice in general when compared to students using notes conferencing. Students indicated that the two techniques did not differ in providing students with an opportunity to give advice. Although there were statistically significant differences between the perceptions of the students regarding the two techniques, the mean scores for both techniques were at the positive end of the scale.

Impact Outside of the Situation

Students in both courses were asked to indicate the extent to which participation in CMC or the fishbowl influenced their level of participation in the lecture course. Students in CMC indicated that the experience had more influence in increasing their classroom participation (M = 3.32) than did those in the fishbowl (M = 4.46), $F(1, 50) = 5.19$, $p < .05$. There was no significant

difference between students in CMC ($M = 3.58$) and those in the fishbowl ($M = 3.64$), $F(1, 50) < 1$, on the extent to which they discussed their research projects outside of class.

Discussion

In general, both computer-mediated conferencing and the fishbowl technique had a positive effect on student collaboration. Students indicated that both techniques were beneficial to them in completing their research projects, as shown by the positive ratings given each technique. Students perceived both techniques as beneficial in providing a forum through which they received peer assistance in research design as well as understanding and solving problems in methodology. While students using computer-mediated conferencing indicated a positive evaluation of the technique, it was not as positive as those using the fishbowl technique. This could be due to a number of factors outside the relative efficacy of the techniques. A confound exists in that those students who used CMC and those in the fishbowl differed from one another in type of major (Sociology vs. Psychology), instructor (Wysocki vs. Miller), and the style of teaching. Because of these potential confounds we should treat this as a preliminary study. The best experimental design for comparing these two techniques would be to have two or more instructors randomly assigned to teach using one of the techniques or to have each instructor teach the same class using both techniques for different sections. However, Given teachers' preferences instructional techniques, this would not be easy to implement. While this confound of the independent and extraneous variables requires caution in interpreting statistical differences between the two groups, it should not diminish the overall finding that students in both conditions actively participated in the collaborative learning process and indicated that they derived real benefit from the process.

The study did not find a difference in the number of comments made by students who participated in CMC and those in the fishbowl. While the average number of comments made by students did not differ, the types of comments made by the students differed somewhat. Those who interacted using CMC were more likely to make general supportive statements of other students' efforts, while those in the fishbowl were more likely to comment on specific methodological issues.

Students were asked to indicate why they participated in the collaborative learning process. In general, students in the two groups did not report differences in motivation. Both groups of students indicated that their primary reason for participation was to seek help with research problems. The second highest rated reason for those in the fishbowl was to help others with their research, whereas students using CMC indicated that earning an acceptable grade was their second highest ranked reason for participation. This is interesting since in neither condition did students receive a grade simply for participating. It is possible that the face-to-face interaction of the fishbowl is more likely to promote helping behavior although this difference may again be a function of the confounding factors mentioned previously.

Another difference between the groups that needs to be addressed is the unequal sample size. The CMC group consisted of 38 students while the fishbowl group consisted of 14 students. It would be difficult to implement a fishbowl in a large class. Therefore, it is encouraging that computer-mediated conferencing, which can be implemented in larger classes, has been shown to provide many of the benefits that face-to-face interaction in the fishbowl provides.

Computer-mediated conferencing is a way for the students to have immediate access to the professor and their peers where "class time limitations no longer restrict student learning and

interaction" (Collins, 1996, p. 191). To be effective, a fishbowl technique can only be used in relatively small groups and the interaction is time limited. CMC provides an avenue for students to think further about a topic raised in a class session since the communication process can be extended well beyond class time.

Both of these techniques encourage peer collaboration. Research by Aronson (1978) has shown that techniques that promote peer collaboration can be used to enhance academic performance in a variety of settings including primary and secondary schools as well as colleges and universities. Also, he found that such techniques result in better performance on a wide-range of academic tasks. In our experience, peer collaboration can be particularly valuable in promoting a discussion of issues that require diverse perspectives, or require advanced problem solving techniques that not all students possess. When the academic task requires diverse perspectives or advanced knowledge, either of the procedures for promoting peer collaboration presented in this paper can provide a means for increasing academic performance.

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Table 1

Percent of Student Comments on Various Topics Made Through Computer Conferences or in the Fishbowl

	Computer Conferencing		Fishbowl	
Topic	Percent	n	Percent	n
Formulation of Question	15.3	13	11.5	3
Research Design	23.5	20	23.1	7
Methodological Issues	17.6	15	38.5	10
Ethical Concerns	8.2	7	7.7	2
Statements of Support	14.1	14	7.7	2
Miscellaneous	21.2	16	11.5	3
Total	100.0	85	100.0	27

Table 2

Students' Reasons for Participating in Computer Conferencing or the Fishbowl

	Computer Conferencing		Fishbowl		
Reasons for Participating	Mean	SD	Mean	SD	F(1,50)
Earn an Acceptable Grade	3.00	1.67	3.14	1.87	0.07
Increase Knowledge of Research	3.74	1.36	3.00	1.57	2.67
Help with Research Problems	2.97	1.69	1.42	0.64	11.02**
Experience Cooperation	3.47	1.67	3.36	1.78	0.44
Build Friendships	3.91	1.71	4.36	1.55	0.71
Demonstrate Abilities	4.23	1.52	4.21	1.63	0.01
Help Others on Research	3.62	1.52	2.86	1.68	2.82
Sharpen Critical Thinking	3.42	1.48	3.36	1.28	0.02
Get Through College	4.24	1.74	4.43	1.95	0.11
Practice Social Interaction	3.79	1.43	4.43	1.87	1.73

** $p < .01$.

Table 3

Students' Perceptions about the Benefits of Participating in Computer Conferencing or the Fishbowl

	Computer Conferencing		Fishbowl		
Topic	Mean	SD	Mean	SD	F(1, 50)
Help on Research Design	3.44	1.76	2.50	1.29	9.48**
Understanding Difficult Materials	2.97	1.66	1.79	.81	5.32*
Solving Particular Problems	3.22	1.60	1.64	.50	9.21**
Benefit as a Giver of Advice	3.21	1.43	3.08	1.50	0.08
Benefit as a Receiver of Advice	2.56	1.31	1.54	.52	7.00**

*$p < .05$. **$p < .01$.

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